***BY ORDER OF THE CHIEF,***
***NATIONAL GUARD BUREAU***

***ANGI 21-105***

***9 NOVEMBER 2001***

***Maintenance***

# *CORROSION CONTROL, NONDESTRUCTIVE INSPECTION, AND OIL ANALYSIS PROGRAMS*

**COMPLIANCE WITH THIS PUBLICATION IS MANDATORY**

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This publication implements AFPD 21-1, *Managing Aerospace Equipment Maintenance*, AFI 21-105, *Aerospace Equipment Structural Maintenance*, and AFI 21-124, *Air Force Oil Analysis Program*. This instruction establishes objectives, and assigns responsibilities for implementing and maintaining an effective Corrosion Prevention and Control Program, Nondestructive Inspection Program (NDI), and Oil Analysis Program (OAP) on Air Force systems, equipment, and components in the Air National Guard (ANG). ANG/LGMM is the office of primary responsibility (OPR) for requests for deviations or waivers from the requirements of this instruction. This publication is applicable to all ANG units.

## *SUMMARY OF REVISIONS*

This publication is a revision of ANGI 21-105, *Corrosion Control, Nondestructive Inspection, and Oil Analysis Programs*, 18 Dec 1997. It defines and incorporates significant changes in corrosion prevention and control, aircraft washing, post-wash cleanliness inspections, post-wash corrosion inspections, corrosion training, maintenance painting, and aircraft markings. It assigns responsibilities for aircraft cleanliness inspection, supervised by flightline maintenance; and corrosion inspection, supervised by the aircraft structural workcenter. It assigns responsibilities for Aerospace Ground Equipment (AGE), Avionics, and Munitions Supervisors. This publication defines the responsibilities of the Unit Corrosion Manager, and establishes a "proactive role" in the organization's Corrosion Prevention Program. This publication incorporates the following revisions: cleaning and washing of aircraft (paragraph 3.11.5.); Unit Oil Analysis Program (paragraph 7.4.2. to 7.5.9.); ANG Aircraft Markings (Attachment 6); Typical ANG Tail Configurations (Attachment 7). This publication provides the principles, policies, and objectives required for the ANG Nondestructive Inspections and Oil Analysis Program. It further identifies the ANG NDI weapon system Single Point of Contact (SPOC) responsibilities, and sets forth the policies for the allocating NDI/OAP resources within the ANG.

**1. Glossary of References and Supporting Information** (see Attachment 1)

**2. Command Responsibilities:**

2.1. ANG/LGM

2.1.1. Appoints a Command Corrosion Manager who has the primary responsibility for the ANG Corrosion Prevention and Control Program.

2.1.2. Appoints a command NDI/OAP Manager who has the primary responsibility for the ANG NDI/OAPPrograms.

2.2. Command Corrosion Manager (ANG/LGMM) Responsibilities:

2.2.1. Represents the Command and supports the Corrosion Prevention Advisory Board (CPAB) for ANG assigned weapons systems.

2.2.2. Appoints a SPOC per weapon system to represent the program manager at the various CPAB meetings.

2.2.3. Encourages CPAB support from field units.

2.2.4. Ensures that adequate technical training is available for Aircraft Structural Maintenance (ASM) personnel in AFSC 2A7X3.

2.2.5. Supports and provides technical expertise for Utilization and Training Workshops to ensure that training requirements are current.

2.2.6. Coordinates training requirements with Air Education and Training Command (AETC) to facilitate course scheduling/attendance.

2.2.7. Stresses the importance of an effective Corrosion Control Program within the Command, and assists subordinate units in developing an effective corrosion-training program.

2.2.8. Advocates the importance of communication between Unit Corrosion Managers and weapon system SPOCs.

2.2.9. Coordinates with Air Force Materials Command (AFMC) in the development and testing of new and improved materials, processes, and equipment.

2.2.10. Coordinates and supports the Air Force Corrosion Program Office (AFCPO) by participating in field surveys, Corrosion Program Manager meetings, Corrosion Advisory Boards, and equipment evaluations.

2.3. Command NDI/OAP Manager (ANG/LGMM) Responsibilities:

2.3.1. Appoints a SPOC to serve as a central coordinator for all ANG NDI Laboratories within the assigned weapon system.

2.3.2. Represents ANG/LGM at DOD/Air Force NDI/OAP conferences and meetings.

2.3.3. Conduct periodic Command NDI meetings. Provides equipment and NDI program status briefings.

2.3.4. Ensures adequate technical training is current and available for NDI/OAP Program.

2.3.5. Identify training requirements to the AETC to facilitate course scheduling/attendance.

2.3.6. Supports the Air Force NDI/OAP Program Office by participating in NDI/OAP equipment evaluations, field evaluations, NDI/OAP Integrated Process Teams, NDI/OAP Product Improvement Teams, NDI/OAP Managers meetings, and advisory boards.

2.4. NDI/OAP and Corrosion SPOC Responsibilities: Weapon System SPOCs will provide technical support and assistance to ANG units within the assigned weapon system. Single points will attend meetings/conferences, provide continuity, and act as an extension of ANG/LGMM for their specific weapon system, IAW ANGI 21-101, *Maintenance Management of Aircraft.*

**3. Unit Corrosion Control Program.**

3.1. Logistics Group Commander Responsibilities:

3.1.1. Ensure the unit has an effective Corrosion Prevention and Control Program.

3.1.2. Publishes Operating Instructions (OI), outlining local policy and procedures for the following:

3.1.2.1. Designate a Senior NCO with appropriate technical background and corrosion control experience to serve as the unit Corrosion Prevention and Control Manager.

3.1.2.2. Ensure that a corrosion-training program is established.

3.1.2.3. Ensure all personnel involved in aircraft maintenance receive corrosioncontrol (initial and refresher) training, and meet safety and health requirements, as set forth under the Occupational Safety and Health Administration (OSHA).

3.1.2.4. Ensure local procedures are established for periodic cleaning of aircraft and support equipment, IAW applicable publications.

3.1.3. Ensure that the Unit Corrosion Manager participates in Command and weapon system Corrosion Prevention and Control Programs.3.1.4. Ensure that funding is requested for facilities, manpower, equipment, and materials to support a sound Corrosion Control Program. Minimum requirements are:

3.1.4.1. Ensure that an adequate corrosion control facility is available to wash aircraft, to perform minor maintenance, and to paint assigned aircraft. In addition, ensures that adequate back shop space is available to accomplish corrosion treatments and paint requirements for support equipment (SE) and small aircraft parts.

3.1.4.2. Ensures facility-control technology meets both local, state, and federal Environmental Protection Agency requirements and National Emission Standards for Hazardous Air Pollutants (NESHAP).

3.2. Unit Corrosion Manager Responsibilities:

3.2.1. Organizes and manages the unit's Corrosion Prevention Program IAW all applicable publications.

3.2.2. Establish a corrosion-control training plan.

3.2.3. Ensure initial and refresher training is provided to aircraft maintenance personnel.

3.2.4. Verify that approved materials and equipment are used to support the Corrosion Control Program.

3.2.5. Attend weapon(s) system CPAB, when possible.

3.2.6. Attend DOD, Air Force, and ANG Corrosion Program Manager meetings, and workshops, when possible.

3.2.7. Coordinates with all aircraft maintenance functions for recommendations or suggestions that would enhance corrosion prevention and structural integrity of the assigned aircraft.

3.2.8. Submits CPAB action-items to the weapons-system corrosion SPOC for review and coordination with MAJCOM and ALC Corrosion Managers, IAW AFI 21-105, *Aerospace Equipment Structural Maintenance.*

3.3. Aircraft Structural Maintenance (ASM) Supervisor Responsibilities:

3.3.1. Ensure that corrosion inspections are accomplished during each phase/periodic inspection for aircraft by using weapon system-6 work cards or a locally devised work deck.

3.3.2. Ensure personnel complete a corrosion inspection after each aircraft wash using Table A2., Aircraft Post-Wash Corrosion Inspection (See Attachment 2), or locally developed guidance.

3.3.3. Ensure corrosion prevention and treatment procedures are accomplished according to technical order requirements.

3.3.4. Coordinates with the Logistics Group Commander (LG), Unit Corrosion Manager, and Quality Assurance to request depot assistance IAW T.O. 00-25-107, *Maintenance Assistance*, when corrosion treatments/repairs are beyond the unit's capability.

3.3.5. Ensure that all personnel receive adequate training to accomplish assigned tasks, operate corrosion-prevention equipment, changes to inspection techniques, keep abreast of new qualified materials, and advances in equipment technology.

3.3.6. Ensure that no other maintenance is accomplished on aircraft or equipment during corrosion-prevention treatment/minor painting when hazardous/toxic materials are used, which require the use of personal- protective equipment (PPE).

3.3.7. Ensure Bioenvironmental Services conduct initial baseline comprehensive evaluations, and provide annual follow-ups to determine adequacy of work center controls for occupational hazards.

3.3.8. Ensure ASM (AFSC 2A7X3) personnel receive Occupational Physicals as deemed necessary by local Medical Group Aeromedical Services IAW AFM 30-130, *Base Level Military Personnel System Users Manual*, AFOSH Standard 161-17, *Standardized Occupational Health Program*, and AFI 48-101, *Aerospace Medical Operations*.

3.3.9. Manage the corrosion-control facility to include procurement of only qualified products from the Qualified Products Lists (QPL), and appropriate Technical Orders.

3.4. Aircraft Flight Chief/Element Supervisor Responsibilities:

3.4.1. Accomplish a cleanliness inspection of aircraft after completion of wash using Table A3., Aircraft Post-Wash Cleanliness Inspection (See Attachment 3), or locally developed guidance. The Dock Supervisor may accomplish the cleanliness inspection for phase/periodic aircraft washes only.

3.4.2. Appoint an aircraft wash supervisor (Crew Chief/Assistant Crew Chief) for each wash. The wash supervisor uses the Aircraft Pre-Wash Supervisor's Guide (See Attachment 4) and the Supervisor's Safety Briefing, (see Attachment 5), or locally developed guidance. The wash supervisor ensures the wash facility is clean, equipment is properly maintained, and stored at the completion of each wash.

3.4.3. Ensures that Aircraft Generation Squadron (AGS) personnel are trained in the correct procedures for aircraft washing and cleaning using weapon-system technical data, job guides, and general information in T.O. 1-1-691, *Aircraft Weapon Systems Cleaning and Corrosion Control.*

3.4.4. Coordinates the use of wash rack/corrosion-control facilities, when necessary.

3.4.5. Performs washing and cleaning of assigned weapon system, using aircraft wash crews and cleaning products authorized by T.O.'s and approved to a Qualified Product List (QPL). Units using wash contractors will be thoroughly familiar with contract specifications, applicable technical orders, and acceptable inspection criteria.

3.4.6. Designates a wash inspector who is responsible for ensuring the wash performed by the contractor is IAW this instruction.

3.4.7. Procures and maintains personal protective equipment which is used during the wash process.

3.5. Quality Assurance Responsibilities:

3.5.1. Monitors aircraft washing operations to ensure that qualified products and equipment are used, wash crews are properly trained, Plans and Scheduling has scheduled washes, and washes are being accomplished IAW the schedule listed in T.O. 1-1-691. Checks aircraft for cleanliness, corrosion, and lubrication after washing.

3.5.2. It is recommended that personnel who evaluate aircraft wash operations attend an AF approved Aircraft Corrosion Control training course.

3.6. Avionics Supervisor Responsibilities:

3.6.1. Ensures an effective Corrosion Control Program is established and enforced for avionics components and equipment.

3.6.2. Ensures that assigned personnel receive corrosion prevention and control training under the direction of the Unit Corrosion Manager and the Avionics Supervisor.

3.6.3. Ensures avionics work sections are familiar with, and have available for use, T.O. 1-1-689, *Avionics Cleaning and Corrosion Control*.

3.6.4. Ensures avionics maintenance personnel inspect for corrosion. When corrosiondamage is beyond the capability of the shop, request assistance from the ASM work center.

3.6.5. Enforces the use of approved cleaning products authorized by Technical Data and QPLs.

3.7. Aerospace Ground Equipment (AGE) Supervisor Responsibilities:

3.7.1. Ensures an effective Corrosion Control Program is established and enforced for assigned equipment.

3.7.2. Ensures that AGE maintenance personnel receive corrosion prevention and control training under the direction of the Unit Corrosion Manager and AGE supervisor.

3.7.3. Ensures powered and non-powered AGE is cleaned, thoroughly inspected, and touched-up as necessary during each periodic inspection See T.O. 1-1-691, T.O. 35-1-3, *Painting of Aerospace Ground Equipment* and T.O. 35-1-12, *Compounds and Procedures for Cleaning Support Equipment*. Units that operate within 1.25 miles (2km) of salt water should consider a 30 day wash/rinse program, and a 15 day clear water rinse for all powered and non-powered equipment. A regular wash/rinse program will greatly improve the unit's ability to prevent corrosion.

3.7.4. Enforces the use of approved cleaning products provided by Technical Data and Qualified Product Lists (QPLs).

3.7.5. Encourages the use of corrosion-preventative compounds (CPC).

3.7.6. Repainting will be determined by AGE supervision.

3.7.6.1. Surface preparation will be accomplished by owning work center.

3.7.6.2. Repainting will be accomplished by qualified AGE personnel, ASM personnel, or qualified contractor.

3.8. Munitions Supervisor Responsibilities:

3.8.1. Ensures an effective Corrosion Control Program is established and enforced for assigned missiles, munitions, handling equipment, and trailers.

3.8.2. Ensures that munitions-maintenance personnel receive corrosion prevention and control training under the direction of the Unit Corrosion Manager and Munitions Supervisor.

3.8.3. Ensures that equipment is cleaned and corrosion treated during each periodic inspection, IAW T.O. 1-1-691, T.O. 35-1-3, T.O. 35-1-12, and specific equipment technical data. Units that operate within 1.25 miles (2km) of salt water should consider a 30 day wash/ rinse program,

and a 15 day clear water rinse for all powered and non-powered equipment. A regular wash/rinse program will greatly improve the unit's ability to prevent corrosion.

3.8.4. Enforces the use of cleaning products approved by Technical Data and the QPLs.

3.8.5. Repainting will be determined by the Munitions Supervisor.

3.8.5.1. Surface preparation will be accomplished by the owning work center.

3.8.5.2. Repainting will be accomplished by qualified munitions personnel, ASM personnel, or qualified contractor.

3.8.6. Encourages the use of CPCs.

3.9. Communications-Electronics (C-E) Activities Responsibilities. C-E Commanders will:

3.9.1. Ensure the Maintenance Support (MS) Supervisor establishes a Corrosion Prevention and Control Program for ground C-E equipment, stressing prevention and control, through equipment cleanliness, timely detection, and maintenance of protective finishes.

3.9.2. Ensure adequate corrosion prevention and training program is in place for initial and recurring training.

3.9.3. Establish support as necessary with the host Aircraft Maintenance Squadron.

3.10. General Corrosion Prevention and Control Issues.

3.10.1. Corrosion Prevention and Control Programs are oriented toward the preventative maintenance concept in controlling corrosion through the maintenance of protective coatings, equipment cleanliness, timely detection, and corrective treatment. Prevention is the key of an effective Corrosion Control Program; therefore, strict adherence to corrosion-prevention polices is essential.

3.10.2. All maintenance personnel, regardless of AFSC (Air Force Specialty Code), are responsible for detecting and documenting corrosion in the proper maintenance forms. Accurate documentation of maintenance actions in support of the Corrosion Control Program is essential to support future manning, equipment, training, and parts/material procurement requirements.

3.10.3. ASM will evaluate corrosion discrepancies to determine proper treatment or repair.

3.10.4. Crossflow of information is essential to the program. This crossflow of information will enable maintenance personnel to communicate effectively with all echelons.

3.11. Cleaning and Washing of Aircraft.

3.11.1. A complete exterior and interior cleaning will be accomplished on all ANG aircraft as directed by T.O. 1-1-691 and prior to each phase/periodic inspection.

3.11.2. Documentation requirements are listed in the Technical Order series 00-20.

3.11.3. Proper lubrication is vital in preventing corrosion. Lubrication prevents water intrusion into bearing cavities and causing corrosion. When personnel wash components, between normal cleaning cycles (flightline washes), relubrication is required.

3.11.4. Units must strictly adhere to scheduled aircraft wash cycles.

3.11.5. Units with aircraft operating near or over salt water must comply with clear water rinsing requirements, IAW T.O. 1-1-691, Appendix E. Deployed units must use every means possible to meet wash and rinse requirements for the Forward Operating Location (FOL). If unable to meet wash and rinse requirements a wavier must be obtained using the guidelines outlined in T.O.1-1-691. Aircraft returning to home station after deployments are required a full wash within seven days of returning to home station.

3.11.6. Aircraft latrine/urinal areas are severe corrosion-prone areas, and must be kept clean.

3.12. Corrosion Prevention and Control Training.

3.12.1. All aircraft maintenance personnel will receive locally developed corrosion prevention and control training under the direction of the Unit Corrosion Manager.

3.12.2. Unit Corrosion Managers will determine refresher training.

3.12.2.1. Personnel in the ASM work centers are exempt from routine corrosion prevention and control training.

3.12.2.2. Corrosion training does not replace normal on-the-job (OJT) requirements for individuals in any career field.

3.12.3. The Unit Corrosion Manager or designated representatives will conduct training. The Unit Corrosion Manager, assisted by the Unit Maintenance Training Manager, updates training materials and information, and develops training curriculum. Training curriculum must include the following:

3.12.3.1. Establishing procedures and techniques for identifying corrosion.

3.12.3.2. Identifying unit specific weapon systems and equipment corrosion-prone areas.

3.12.3.3. Documenting procedures for identifying corrosion.

3.12.3.4. Selecting and using sealants, corrosion-preventive compounds (CPCs), and lubricants.

3.12.3.5. Selecting and using cleaning materials.

## 4. Maintenance Painting.

4.1. Protective coating systems provide protection for aircraft and aerospace ground powered and non-powered equipment surfaces. Technical Orders determine protective coating systems selection.

4.2. Maintenance painting is the application of coatings to aerospace equipment where theexisting coating is deteriorated or missing. Maintenance painting must be kept to a minimum and comply with federal, state, and local environmental regulations. Maintenance painting of aircraft accomplished solely for cosmetics (beautification) is not authorized on ANG aircraft.

4.2.1. Aircraft stripping and repainting at field level is not authorized. When aircraft repainting is beyond the unit's capability, request assistance IAW T.O. 00-25-107, *Maintenance*

*Assistance*. Fighter (A-10, F-15 and F-16) and H-60 aircraft may be scheduled through the ANG Regional Paint Facility, 185 FW, Iowa ANG. This facility presently has a capability for total scuff-sand, and repaint.

4.2.2. Units equipped with environmentally compliant aircraft painting facilities are authorized to perform mid-interval overcoating of aircraft. Overcoating is accomplished no earlier than the mid-point of the coating-service life. Work processes will be coordinated with local Environmental and Bioenvironmental offices.

**5. Aircraft Markings:** Aircraft exterior finishes and markings will be applied to aircraft in accordance with the following guidelines. See Attachment 6, ANG Aircraft Markings.

**6. Unit Nondestructive Inspection Program:**

6.1. Logistic Group Commander Responsibilities:

6.1.1. Ensures applicable programming documents (budget, facilities, manpower, maintenance, etc.) include the need for NDI support.

6.1.2. Ensures the following environmental controls are maintainable where radiographic film is stored:

6.1.2.1. Temperature of 75 degrees F (IAW T.O. 33B-1-1, *Nondestructive Inspection Methods*).

6.1.2.2. Humidity of 60% or less (IAW T.O. 33B-1-1).

6.2. Nondestructive Inspection (NDI) Lab Supervisor Responsibilities:

6.2.1. Organizes, directs, and manages the NDI Program IAW T.O. 33B-1-1 and applicable publications.

6.2.2. When possible, attends DOD, Air Force Worldwide, and ANG Command NDI meetings and workshops.

6.2.3. Ensures only properly trained and certified personnel with AFSC 2A7X2 operate NDI equipment.

6.2.4. Ensures personnel performing NDI attend the AETC basic and seven level courses, or Air Force NDI Program Office approved civilian equivalent courses.

6.2.5. Ensures personnel receive adequate training (formal and OJT) to accomplish assigned tasking, and to acquire skills necessary for changes in inspection techniques and advances in equipment technology.

6.2.6. Ensures Bioenvironmental Services conduct initial baseline comprehensive evaluations, and provide annual follow-ups to determine adequacy of work-center controls for occupational hazards.

6.2.7. Ensures NDI personnel receive Occupational Physicals (OPs) as deemed necessary by local Medical Group Aeromedical Services IAW applicable publications.

**7. Unit Oil Analysis Program (OAP) (Where applicable):**

7.1. Logistic Group Commanders' Responsibilities:

7.1.1. Ensures applicable programming documents (budget, facilities, manpower, maintenance, etc.) include the need for OAP support.

7.1.2. Ensures units that operate and maintain aircraft implement an Oil Analysis (OA) program. Unit responsibilities are specified in T.O. 33-1-37 series, Joint Oil Analysis Program Manuals.

7.1.3. Ensures units submit accurate and timely Quality Deficiency Reports to the Air Force OAP Office on equipment requiring tear down or overhaul due to an OAP laboratory maintenance recommendation.

7.1.4. Ensures the following environmental controls are maintained in the OAP lab:

7.1.4.1. Temperature of 75 degrees F +/-3 degrees, IAW T.O. 33-1-37-2, Joint Oil Analysis Program Manual, volume II, *Spectrometric and Physical Test Laboratory Operating Requirements and Procedures.*

7.1.4.2. Humidity of 50% or less (IAW T.O. 33-1-37-2).

7.1.5. Ensures the Maintenance Operation Center maintains an OAP status on each assigned aircraft.

7.1.6. Assigns assistant managers in writing (preferably flightline expediters, pro-supers, or flight chiefs on each shift) and provides the OAP lab with a current list of managers. They are the SPOC for the OAP lab concerning samples and discrepancies.

7.1.7. Each LG publishes an OI giving detailed guidance for accomplishing the OAP as specified in this publication and other applicable guidance.

7.2. Propulsion Shop Supervisor Responsibilities:

7.2.1. Is assigned as the primary unit OAP Manager.

7.2.2. Conducts periodic OAP meetings consisting of all OAP Managers, Assistants, and the NDI Lab Supervisor or designated representative. The purpose of these meetings is to resolve base OAP problems.

7.2.3. Ensures a copy of DD Form 2027 or computer-generated copy of the Oil Analysis Record accompanies each engine undergoing depot maintenance.

7.2.4. Determines follow-on engine maintenance requirements based upon oil analysis recommendations.

7.3. Nondestructive Inspection (NDI) Lab Supervisor Responsibilities:

7.3.1. Is assigned as the alternate OAP Manager.

7.3.2. Ensures only properly trained personnel operate OAP equipment. Units may utilize personnel that do not have the 2A7X2 AFSC to perform oil analysis, providing thequalification requirements of T.O. 33-1-37 for OAP operators and evaluators are met.

7.3.3. During contingency or mobility moves, ensures deployable spectrometers are properly packaged and secured when being removed from the OAP Lab.

7.3.4. Ensures assigned OAP spectrometers are Joint Oil Analysis Program (JOAP) certified IAW T.O. 33-1-37-1, Joint Oil Analysis Program Manual, volume I, *Introduction, Theory, Benefits, Customer Sampling Procedures, Programs, and Reports.* Ensures assigned OAP spectrometers maintain a three-month correlation average of 80% or better.

7.3.5. Ensures OAP Lab inputs accurate and timely data into the central database.

7.3.6. NDI personnel will not be designated as OAP monitors when an off-based OAP Lab is servicing the unit.

7.4. Oil Sampling Procedures:

7.4.1. Instructions and procedures for sampling, documenting forms, reporting data, obtaining supply requirements, and taking special samples are as specified in T.O. 33-1-37 series, and weapon specific technical data.

7.4.2. Intervals for sampling requirements are specified in the applicable weapon system specific scheduled maintenance or periodic inspection document –6 and this document.

7.4.2.1. Single engine fixed-wing aircraft assigned to Air National Guard (ANG) will be sampled after every flight and the results known prior to the next flight. If an oil sample result cannot be determined before the next flight due to equipment problems or other factors, then the aircraft may fly one additional sortie. The aircraft will not be flown three consecutive sorties without an oil sample taken and the results known.

7.4.2.2. F-16s with F110-GE-100/-129 engines will be sampled after the first flight of the day IAW -6 requirements. Results must be known before the next flight. The interval between samples will not exceed 10 engine operating hours. If the sample results cannot be determined before the next flight due to equipment problems or other factors, the aircraft may fly one additional sortie. The aircraft will not be flown three consecutive sorties without an oil sample taken and the results determined

7.4.2.3. Multi-engine fixed wing fighter aircraft assigned to ANG will be sampled after the first flight of the day, or as specified in the applicable -6. Results will be known prior to the next day's flying. Interval between sample will not exceed 10 engine operating hours.

7.4.3. Take sample prior to adding oil.

7.5. The following procedures apply when in a transient or cross-country status/deployed status:

7.5.1. Aircraft Commander ensures aircraft are sampled while in transient status.

7.5.2. Flightline personnel place an oil analysis record (DD form 2027 or automated product) with a minimum of the last ten sample readings in the aircraft records jacket.

7.5.3. During unit deployments OAP personnel hand-carry the DD Form 2027 (or automated product). If OAP personnel are not included in the deployment, the unit OAP Manager ensures the copies of DD Form 2027 (or automated product) are delivered to the supporting OAP Lab, retrieved upon redeployment, and delivered to the home-station OAP Lab as soon as possible.

7.5.4. Every effort shall be made to obtain OA support at transient locations. Oil samples will be taken regardless of local oil analysis capability.

7.5.5. When OAP capability exists at a transient location and sample is required, the aircrew obtains sample results before departure.

7.5.6. If sample results cannot be provided due to time restraints, the aircrew will request transient maintenance personnel forwarded the results by telephone or fax to the next destination. The aircrew ensures a standard entry is placed in the AFTO Form 781A, *Maintenance Discrepancy and Work Document,* before departure. 781A entry is: Engine oil analysis results are unknown.

7.5.7. If sample results cannot be provided due to lack of OA capability, samples are taken at departure base and carried to and processed at the next destination. Aircrew ensures a standard entry is placed in the AFTO Form 781A as specified in paragraph 7.5.6.

7.5.8. In no case will single engine fixed-wing aircraft fly more than two consecutive sorties without OA sample results being known (Exception: F-16 with F110-GE-100/-129 engines will be sampled IAW -6 requirements).

7.5.9. Multi-engine fixed wing fighter aircraft will be sampled after the first flight of the day or as specified in the applicable -6.

**8. Operating Instructions (OI):** Each LG publishes an OI giving detailed guidance for accomplishing OA. Guidance includes, but is not limited to:

8.1. Designating the responsibility to the AGS (Aircraft Generation Squadron) for taking samples and establishing procedures for delivery to the OAP Lab.

8.2. Ensuring training is provided to all affected personnel.

8.3. Providing procedures for backup support in the event the oil analysis spectrometer is out of commission.

8.4. Providing procedures to ensure aircraft under special surveillance have samples analyzed before the next flight or engine operation.

8.5. Providing procedures to ensure aircraft under special surveillance are flown only on home-station flights. Owning unit LG waiver is required for extenuating circumstances.

8.6. Ensuring oil samples, when due, are taken promptly after engine shutdown and before oil servicing. It is desirable to sample within 30 minutes after shutdown.

8.7. Providing procedures to ensure an information interchange is established between the Propulsion Shop and OAP Lab.

8.8. Providing procedures for including the OAP Lab during aircraft records document reviews.

8.9. Providing procedures establishing proper communication channels regarding abnormal trends detected.

8.10. Providing procedures for ensuring the Propulsion Shop sends a message to the respective Air Logistics Center OAP Manager, when an engine or a major component is sent to depot as a result of oil analysis.

8.11. Defining the duties and responsibilities of the assistant and alternate managers.

PAUL A. WEAVER, JR., Major General, USAF
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OFFICIAL

DEBRA N. LARRABEE, Colonel, USAF
Chief, Support Services

**Attachment 1**

**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION**

***References:***

*AF Technical Order System.*

AFPD 21-1, *Managing Aerospace Equipment Maintenance*

AFI 21-105, *Aerospace Equipment Structural Maintenance*

AFI 21-124, *Air Force Oil Analysis Program*

AFI 48-101, *Aerospace Medical Operations*

AFIND 17, *Index of Air Force Occupational Safety and Health (AFOSH)*

AFM 30-130, *Base Level Military Personnel System Users Manual*

AFOSH Standard 48-1, *Respiratory Protection Program*

AFOSH Standard 91-31, *Personal Protective Equipment*

AFOSH Standard 91-66, *General Industrial Operations*

AFOSH Standard 91-110, *Nondestructive Inspection and Oil Analysis Program*

AFOSH Standard 127-32, *Emergency Shower and Eye wash Units*

AFOSH Standard 127-100, *Flight Line-Ground Operations and Activities*

AFOSH Standard 161-2, *Industrial Ventilation*

AFOSH Standard 161-17, *Standardized Occupational Health Program*

ANGI 21-101, *Maintenance Management of Aircraft*

T.O. 00-25-107, *Maintenance Assistance*

T.O. 1-1-8, *Application of Organic Coatings*

T.O. 1-1-689, *Avionics Cleaning and Corrosion Prevention/Controls*

T.O. 1-1-691, *Aircraft Weapons Systems Cleaning and Corrosion* Control

T.O. 33-1-37 *Series, Joint Oil Analysis Program Manuals*

T.O. 33B-1-1, *Nondestructive Inspection Methods*

T.O. 35-1-3, *Painting of Aerospace Ground Equipment*

T.O. 35-1-12, *Compounds and Procedures for Cleaning Support Equipment*

*National Institute for Occupational Safety and Health (NIOSH) Publications*

*Standards, Department of Labor Occupational Safety and Health (OSHA) Standards*

***Abbreviations, Acronyms:***

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|---|---|
| **AETC** | Air Education and Training Command |
| **AFCPO** | Air Force Corrosion Program Office |
| **AFI** | Air Force Instruction |
| **AFOSH** | Air Force Occupational Safety and Health |
| **AFM** | Air Force Manual |
| **AFMC** | Air Force Material Command |
| **AFR** | Air Force Regulation |
| **AFSC** | Air Force Specialty Code |
| **AGE** | Aerospace Ground Equipment |
| **AGS** | Aircraft Generation Squadron |
| **ALC** | Air Logistics Center |
| **ANG** | Air National Guard |
| **ANGI** | Air National Guard Instruction |
| **ANGR** | Air National Guard Regulation |
| **ANGRC** | Air National Guard Readiness Center |
| **ASM** | Aircraft Structural Maintenance |
| **C-E** | Communications Electronics |
| **CPAB** | Corrosion Prevention Advisory Board |
| **CPC** | Corrosion Preventive Compound |
| **CTIO** | Coating Technology Integration Office |
| **CTSC** | Coating Technology Screening Committee |
| **DOD** | Department of Defense |
| **GMAJCOM** | Gaining Major Command |
| **JOAP** | Joint Oil Analysis Program |
| **LG** | Logistics Group Commander |
| **MAJCOM** | Major Command |
| **MS** | Maintenance Support |
| **MSDS** | Material Safety Data Sheet |

| | |
|---|---|
| **NDI** | Nondestructive Inspection |
| **NESHAP** | National Emission Standards for Hazardous Air Pollutants |
| **NGR** | National Guard Regulation |
| **OA** | Oil Analysis |
| **OAP** | Oil Analysis Program |
| **OI** | Operating Instruction |
| **OJT** | On the Job Training |
| **OP** | Operation Physical |
| **OSHA** | Occupational Safety and Health Association |
| **PPE** | Personal Protective Equipment |
| **QPL** | Qualified Products List |
| **SE** | Support Equipment |
| **SPOC** | Single Point of Contact |
| **T.O.** | Technical Order |

**Attachment 2**

## AIRCRAFT POST-WASH CORROSION INSPECTION

**A2.1. Purpose:** To provide general, minimum, requirements for performing aircraft post-wash corrosion inspections. Units may add requirements as necessary to enhance corrosion inspection procedures. Copying of this table is authorized.

**A2.2. Aircraft Structural Maintenance work center responsibilities:**

A2.2.1. Upon completion of this inspection, corrosion discrepancies found are entered in the applicable records.

A2.2.2. Clear the post-wash corrosion inspection from aircraft AFTO 781A.

**A2.3. Instructions:** Inspect aircraft for the following conditions: corrosion, residual water, soap residue, paint- condition, sealant-condition using Table A2.

A2.3.1. Column 1: Minimum corrosion prone areas to be inspected.

A2.3.2. Column 2: Verify inspection complied with by placing a checkmark in this column.

A2.3.3. Column 3: Place a checkmark if area does not apply to weapon system.

A2.3.4. Column 4: Enter findings in this column.

**Table A2. Aircraft Post-Wash Corrosion Inspection.**

| **Tail Number:** | | | **Date:** |
|---|---|---|---|
| **Minimum Corrosion Prone Area To Be Inspected** | **Inspection Complied With** | **Area Does Not Apply To Weapons System** | **Findings/Remarks** |
| Landing Gear | | | |
| NLG wheels | | | |
| NLG assembly | | | |
| NLG wheel well | | | |
| MLG wheels | | | |

| | | | |
|---|---|---|---|
| MLG assembly | | | |
| MLG wheel wells | | | |
| Fuselage External | | | |
| Bottom Of Fuselage | | | |
| Tip of radome to NLG | | | |
| NLG to MLG | | | |
| MLG to tail | | | |
| Sides and Top | | | |
| Nose to wing root area | | | |
| Fwd wing root to aft wing root | | | |
| Aft wing root to tail | | | |
| Empennage External | | | |
| Vertical stabilizer | | | |
| Horizontal stabilizer | | | |
| Tail Pylon (Helicopters) | | | |
| Engines | | | |
| Nacelle areas | | | |
| Cowling | | | |
| Intake | | | |
| Exhaust Path | | | |
| Propeller/rotor blades | | | |
| Pylons | | | |
| Wings | | | |
| Top of left wing | | | |
| Bottom of left wing | | | |
| Left wing flapwell | | | |
| Top of right wing | | | |
| Bottom of right wing | | | |
| Right wing flapwell | | | |

| Aircraft Interior | | | |
|---|---|---|---|
| Cargo compartment floor | | | |
| Lt chine cover | | | |
| Rt chine cover | | | |
| Battery compartment | | | |
| Galley | | | |
| Flight Deck/cockpit | | | |
| Latrine/urinal area | | | |

## Attachment 3

## AIRCRAFT POST-WASH CLEANLINESS INSPECTION

**A3.1. Purpose:** To provide general, minimum, requirements for performing aircraft post-wash cleanliness inspections. Units may add requirements as necessary to enhance cleanliness inspection procedures. Copying of this table is authorized.

**A3.2. Definitions:** Clean. All references to the condition of clean pertain to the following description: To determine if surfaces are clean, a close visual inspection is accomplished to ensure all residue, oily film, and streaking have been removed.

**A3.3. General:** The aircraft post-wash cleanliness inspection is accomplished by the Flight Chief/Element or Isochronal Inspection (ISO) Dock Supervisor.

**A3.4. Documentation:** The following entries are recommended:

A3.4.1. Aircraft taped and prepped for wash. This entry is entered in the forms on a red X prior to the wash. It is cleared after the cleanliness inspection is successfully completed.

A3.4.2. Aircraft due cleanliness inspection. This entry is placed on a red dash, and cleared by the Flight Chief /Element Supervisor.

A3.4.3. Aircraft due corrosion inspection. This entry is placed on a red dash, and cleared by the ASM work center.

A3.4.4. Aircraft due lube after wash. This entry is entered in the forms on a red X.

**Table A3. Aircraft Post-Wash Cleanliness Inspection.**

| **Tail Number:** | | | **Date:** |
|---|---|---|---|
| **Landing Gear (grease, dirt, oil, brake dust, tire deposits, & soap residue)** | | | |
| | CLEAN | DIRTY | REMARKS |
| NLG wheels | | | |
| NLG assembly | | | |
| NLG wheel well | | | |
| MLG wheels | | | |

| | | | |
|---|---|---|---|
| MLG assembly | | | |
| MLG wheel wells | | | |
| Fuselage External (dirt, oil, grease, trapped fluids & soap residue) | | | |
| | CLEAN | DIRTY | REMARKS |
| Bottom of fuselage | | | |
| Tip of radome to NLG | | | |
| NLG to MLG | | | |
| MLG to tail | | | |
| Sides and Top | | | |
| | CLEAN | DIRTY | REMARKS |
| Nose to wing root area | | | |
| Fwd wing root to aft wing root | | | |
| Aft wing root to tail | | | |
| Empennage External | | | |
| | CLEAN | DIRTY | REMARKS |
| Vertical stabilizer | | | |
| Horizontal stabilizer | | | |
| Tail Pylon (Helicopters) | | | |
| Nacelle (dirt, debris, oil, grease, soap residue & exhaust path residue) | | | |
| | CLEAN | DIRTY | REMARKS |
| Nacelle areas | | | |
| Cowling | | | |
| Intake | | | |
| Exhaust Path | | | |
| Propeller / Rotor Blades | | | |
| Pylons | | | |
| Aircraft Interior (dirt, debris, stains, spilled or trapped fluids) | | | |
| | CLEAN | DIRTY | REMARKS |
| Cargo compartment floor | | | |

| | | | |
|---|---|---|---|
| Lt chine cove | | | |
| Rt chine cove | | | |
| Battery compartment | | | |
| Galley | | | |
| Flight Deck / Cockpit | | | |
| Latrine/Urinal (urine, residue, dirt, debris, stains, spilled or trapped fluids) | | | |
| | CLEAN | DIRTY | REMARKS |
| Latrine/Urinal/Surroundings | | | |
| Wings (dirt, oil, grease, trapped fluids, and soap residue) | | | |
| | CLEAN | DIRTY | REMARKS |
| Top of left wing | | | |
| Bottom of left wing | | | |
| Left wing flapwell | | | |
| Top of right wing | | | |
| Bottom of right wing | | | |
| Right wing flapwell | | | |

## Attachment 4

## AIRCRAFT PRE-WASH SUPERVISOR'S GUIDE

**A4.1.** Are all eyewash and showers inspected and in operating condition? Is the wash facility clean?

**A4.2.** Is the air pressure source regulated to equipment specifications?

**A4.3.** Is all Personal Protective Equipment (PPE) in serviceable condition?

**A4.4.** Is there enough PPE for all personnel?

**A4.5.** Is the aircraft properly configured for wash?

**A4.6.** Is an approved soap used, IAW T.O. 1-1-691 and the QPL?

**A4.7.** Are all stands and washing equipment inspected and in serviceable condition?

**A4.8.** Are all applicable Material Safety Data Sheets (MSDS's) available at the work location?

**A4.9.** Is the mixture of soap and water IAW T.O. 1-1-691 or the manufacture's instructions?

## Attachment 5

## SUPERVISOR'S SAFETY BRIEFING

**A5.1.** Explain the use of PPE.

**A5.2.** Explain the proper use of all safety equipment and show all personnel the location of eyewash stations, shower, and emergency exits.

**A5.3.** Brief all personnel on workplace hazards:

A5.3.1. Wet floors

A5.3.2. Hoses on floor

A5.3.3. Pushing stands on wet floors

A5.3.4. Aircraft protrusions hazards

A5.3.5. Water and soap dripping from aircraft

A5.3.6. Standing on aircraft without proper safety gear

A5.3.7. Working in wheel well's, dangers of bumping head and sharp objects

A5.3.8. Air pressure adjustmentsA5.3.9. Using stands that are wet

**A5.4.** Brief all personnel on MSDS's that are applicable:

A5.4.1. Brief specific hazards of chemicals

A5.4.2. Brief emergency and first aid procedures for the specific chemicals

A5.4.3. Brief location of MSDSs

## Attachment 6

## ANG AIRCRAFT MARKINGS

**A6.1. Aircraft Marking Guidance:**

This attachment implements the polices outlined in AFI 12-105, *Aerospace Equipment Structural Maintenance*, and provides guidance for applying command approved, non-USAF standard, aircraft marking, as authorized in T.O. 1-1-8. Paint schemes/configurations and USAF standard aircraft markings will be applied in accordance with T. O. 1-1-8, Specific Weapons System –23, or SPD-approved aircraft drawings. Aircraft markings will be applied to aircraft as specifically authorized by ANG/LGM, this instruction, TO 1-1-8, or applicable aircraft T.O., or approved drawings. Aircraft inputs to depot will be marked IAW Air Force directives, unless otherwise approved by ANG/LGM. ANG/LGMM is the point of contact (POC) for aircraft painting and markings. For ACC-gained aircraft, HQ ACC/XFOT is the POC for unit-designation markings, when used.

**A6.2. Appearance Standards:**

A6.2.1. All aircraft markings and basic paint schemes will be maintained intact, legible, and distinct in color. Standardization of markings (by MDS) is of primary concern.

A6.2.2. Fighter units are recommend to overcoat their aircraft at the mid-point of their scheduled PDM/Speed line cycle to maintain the coating system integrity and aircraft appearance. Units are required to adopt maintenance painting techniques (i.e., touch up) at home station, if possible, and use the ANG Regional Paint Facility, Sioux City, Iowa, when overcoat is required.

A6.2.3. Large aircraft units should rely on touch-up maintenance painting between depot cycles to maintain coating integrity. Overcoats will be scheduled through the depot/contractor by ANG/LGMA on a case-by-case basis.

A6.2.4. Fully overcoated aircraft will be documented in CAMS and the individual aircraft AFTO Form 95 for tracking purposes. Weight and balance after a complete overcoat may be required. Check specific weapon T.O. guidance.

**A6.3. Marking Options:** The following options from T.O. 1-1-8 are delegated to the Wing Commander:

A6.3.1. May authorize solar-resistant finishes for personnel carriers or special purpose/mission aircraft.

A6.3.2. May authorize a distinguishing colored horizontal stripe for application on both sides of the top-most portion of the vertical fin and rudder, if applicable. If authorized, colors must match gloss requirements of the basic paint scheme, not to exceed 9 inches on fighter aircraft and 15 inches on large aircraft. The state/city name within the tail stripe may be used. "City of" on nose of aircraft

may be used. Bird of Prey type markings are authorized for F-15 and F-16 aircraft. Size and location TBD by the unit, and must not interfere with standard aircraft marking, but must be in flat colors (black or contrasting grays). AMC-gained aircraft will have two, 2" black bars on the tail (see Attachment 7) and are authorized colors within these stripes with State or City name. Nicknames in the tail stripe are not authorized.

***NOTE:*** if the colored stripe with state/city name is used on tail of a C-130, the optional colored tail marking, top vertical fin, cannot be used. (Reference Para. A6.3.2.) A6.3.3. May authorize aircraft markings that reflect mission activity, crew accomplishment, and unit esprit de corps, within the following guidelines:

A6.3.3. Special markings can be applied on nose, tail, engine nacelles, gear doors, drop tanks, and travel pods. Markings must be distinctive, symbolic, and in good taste. Marking colors must match the gloss requirement of current paint scheme.

A6.3.4. Names of pilots, crew chiefs, or other members of the flight/ground crew maybe applied, IAW T.O. 1-1-8. Application of nicknames and/or call signs is **not authorized**. Units must remove all names prior to deployment in hostile enemy environments.

A6.3.5. May authorize location of placards indicating armament loads on camouflaged aircraft, if not otherwise specified.

**A6.4. Nose Art:** For the purpose of clarification, "nose art" will be the term used to identify specialized artwork applied and located on the left fuselage of an aircraft. Wing Commanders must approve all nose art and be responsible for issues associated with its application. Nose art will not exceed 18 inches for fighter aircraft, 36 inches for larger aircraft and will not infringe on required aircraft markings. Nose art is authorized for all ANG aircraft. Any deviation in size or location must be approved by the Wing Commander, in writing, and kept on file within the unit. Units that are called upon to perform in a hostile environmental may be required to remove nose art prior to deployment or at the FOL. Nose art must:

A6.4.1. Be distinctive, symbolic, and designed in good taste.

A6.4.2. Enhance unit pride.

A6.4.3. Be gender neutral.

A6.4.4. Match gloss requirements of the basic paint scheme.

A6.4.5. Units will be responsible for all copyright issues.

**A6.5. Competition Aircraft:** Units participating in competitions such as William Tell, Gunsmoke, etc., will follow the guidelines established in the competition rules for aircraft appearance. Competitions should be considered "come as you are" and no waivers will be granted. "Come as you are" is defined as no special effort, painting, or additional markings applied to enhance or improve the overall appearance of the aircraft.

**A6.6. Wing Commander's Aircraft:** Wing commanders may select one aircraft to be specifically marked. It will be the **ONLY** aircraft authorized so marked. Highlighting the unit designator is authorized and will be done in contrasting gray colors or white and flat black. No other colors will be authorized. Tail marking must be accomplished without moving or altering radio call numbers. (See specific Weapon System T. O.)

**A6.7. Nonstandard Colors and Markings:** Semi-gloss or high gloss colors are **not authorized** on any camouflage or flat gray aircraft. Tail numbers must not be altered, downsized, or moved, unless approved by the weapons system SPD and ANG/LGMM. Units will forward a clear/detailed color photographs of their aircraft that depict nonstandard markings. A letter of approval from the Wing Commander must accompany photos. Photos will be provided to ANG/LGMM for review and file. If markings are changed in the future, new photos and approval letter from the Wing Commander must be forwarded within 30 days of the change. Original letters of approval must be kept on file at the unit for inspection purposes. Mailing address for photos/letters is as follows: ANG/LGMM, Attention: ASM/Corrosion Functional Manager, 3500 Fetchet Avenue, Andrews AFB MD 20762-5157.

**A6.8. Aircraft Transfers:** Aircraft transferred to another unit or Command must remove the following marking. The only exception is aircraft going into AMARC.

A6.8.1. Organizational insignias

A6.8.2. Unit designator

A6.8.3. Tail stripe

A6.8.4. Aircrew and crew chief names

A6.8.5. Unit unique markings

A6.8.6. Nose art may be retained if gaining unit agrees.

**A6.9. Special Mission Aircraft:** The ANG has a number of "Special Mission Aircraft" assigned. Several of these units maintain aircraft with high gloss paint systems and markings. These aircraft will be marked IAW T.O. 1-1-8 or specific manufacture/SPD drawings. Additional tail marking; i.e., color stripes, Minuteman logo, State name, etc., are optional, and must be approved by the Wing Commander, in writing, and kept on file within the unit.

**A6.10. Anniversary Markings:** Units are authorized to apply anniversary marking to their aircraft. Markings may be applied on the vertical tail or forward fuselage. Anniversary marking must be removed after one year.

A6.10.1. Tail marking must be accomplished without moving or altering radio call numbers. Designs must be painted with flat colors, black & white or contrasting gray colors.

A6.10.2. Forward fuselage markings must not exceed 18 inches for fighter aircraft and 36 inches for large aircraft. Designs may be painted in flat multicolor, flat black or contrasting grays. Criteria for designs must meet the requirements in the Nose Art, paragraph A6.4. and approved by the Wing Commander. Repainting of radomes or SPD-approved paint schemes for anniversary aircraft is not authorized.

**A6.11. Static Display Aircraft:** Static display aircraft located at ANG units must be maintained IAW AFI 84-103. Aircraft record's must be maintained and kept by the unit historian. A Historical Property Agreement with the USAF Museum will be updated biannually. POC for ANG static display aircraft is NGB-PAI-H, 1411 Jefferson Davis Highway Suite 12000, Arlington, Virginia 22202-3231.

**Figure A6. Markings Specifications.**

| Aircraft | Paragragh |
|---|---|
| A/O-10 | A6.12. |
| B-1B | A6.13. |
| HC/MC-130 | A6.14. |
| C-130 E-J | A6.15. |
| F-15 | A6.16. |
| F-16 | A6.17. |
| HH-60 | A6.18. |
| C-5 | A6.19. |
| C-141 | A6.20. |
| C-17 | A6.21. |
| KC-135 | A6.22. |

***NOTES:***

1. The word "**Optional**" means a local Wing Commander option and **will not** be placed on the aircraft during PDM or contractor scuff sand and paint. Units must apply at home station.

2. The use of computer stencil makers, and vinyl material at local units and Depot/Contractors is authorized IAW T.O.1-1-8. Variations in size, width, length, and spacing of letters/numbers may be different due to the various computer programs available.

**A6.12. OA/A-10**

COMMAND MINUTEMAN INSIGNIA: 18 inches (flat black) **Optional.** TBD by Wing Commander, (tail or fuselage)

ORGANIZATIONAL INSIGNIA: 18 inches (flat decal or colors) **Optional.** Left Side: above panel F-18 and aft of panel F-44. Right side: above panel F-79 and aft of panel F-105.

UNIT DESIGNATOR: 12 inches (flat black) **Optional.** Vertical: Lower edge 3 inches above tail numbers. Horizontal: Centered on vertical stabilizer.

PILOT AND CREW CHIEF NAMES: (flat black) **Optional.** Pilot on left side under windscreen beginning at FS 118.92. Crew chief under pilots name. Assistant crew chief under crew chief name.

AIR FORCE OUTSTANDING AWARD: 3 inches by 12 inches (flat decal, contrasting grays or flat black) Centered 3 inches above crew entry door. **Optional.** NOSE NUMBER: 6 inches (flat black). Last three/four digits of tail number on both sides of aircraft nose.

RADIO CALL NUMBERS: 6 Inches (flat black). Location: IAW T.O. 1A10A-23- Detail 75.

TAIL FLASH: must not extend on to the rudder area, due to critical weight and balance requirements of the rudders.

**A6.13. B1B**

COMMAND MINUTEMAN INSIGNIA: 24 inches (flat black) **Optional.** Location TBD by Wing Commander, (tail or fuselage).

ORGANIZATIONAL INSIGNIA: 24 inches (flat decal or flat colors) **Optional.** Located 6 inches below and aft of the OSO/DSO windows.

UNIT DESIGNATOR: 30 inches (flat black) **Optional.** Located 7 inches down from the command insignia. On right side of tail, trailing edge of first letter will lay along a vertical line from center of command insignia. On left side of tail, trailing edge of second letter in unit designator will lay along a vertical line from center of command insignia.

PILOT/AIRCREW/CREW CHIEF NAMES: 3 inches in height maximum (flat black) **Optional.** Pilot/aircrew: Centered on forward escape hatch side window. Crew chief/assistant: Left nose gear door 3 inches in height maximum.

NOSE NUMBERS: 3 inches in height maximum (flat black). Last three/four digits of tail number, on nose gear strut, both sides.

AIR FORCE OUTSTANDING AWARD: 3 inches by 12 inches (flat decal, contrasting grays or flat black) Centered 3 inches above crew entry door. **Optional.**

RADIO CALL NUMBERS: 15 inches (flat black) Location IAW 1B-1B-2-11GS-00-1 Figure 6-10.

### A6.14. HC/MC-130

Aircraft assigned to the 106th, 129th and 176th will be painted in the AFSOC paint scheme, using AFSOC Drawing #93104893. Paint and markings will be two tone, colors # 36118 dark gray, and #36293 light gray. US Flag decals will not be authorized on these aircraft. All other marking will be Wing Commander options.

COMMAND MINUTEMAN INSIGNIA: 30 inches (contrasting gray) **Optional.** Location TBD by Wing Commander, (tail or fuselage).

ORGANIZATIONAL INSIGNIA: 30 inches (contrasting gray) **Optional.** Insignia will be placed on the fuselage, the bottom of the insignia will center on WL 190.0. The insignia will be centered on FS 270.0.

UNIT DESIGNATOR: 36 inches (contrasting gray) **Optional**. Vertical: Bottom of unit designator is located at VS 63.0. Horizontal: Centered between FS 1068.0 and 1122.0.

RADIO CALL NUMBERS: 15 inches (contrasting gray) **Optional.** Vertical: Bottom of call number is located at VS 36.0. Horizontal: Centered between FS 1068.0 and 1122.0

PILOT/CREW CHIEF/ASSISTANT NAMES: (contrasting gray) **Optional**. Names can be located on either side of the fuselage. Size and location determined by the unit.

AIR FORCE OUTSTANDING AWARD: 3 inches by 12 inches (flat decal, contrast gray). Centered 3 inches above crew entry door. **Optional.**

STATE NAME: 10 inch (contrasting gray) **Optional.** Centered on FS 551.00 and 10 inches from main landing gear door hinge point.

BLACK EXHAUST TRACKS: **Optional**. Black exhaust tracks may be added to the bottom of the wing and flap areas only. This was approved by C-130 Engineering and AFSOC HQ, as a field level option. Each black exhaust track will not exceed 96”wide.

### A6.15. C-130 E-J

Aircraft assigned to Hawaii and Alaska are authorized PACAF tail marking configuration, (HH or AK) in flat black # 37038 on aircraft Equipment Excellence flat gray, color # 36173. (See Attachment 7, Typical ANG Tail Marking Configurations).

UNITED STATES FLAG: 24 inches by 48 inches (Matte). Both sides vertical stabilizer, bottom of flag located 154 inches above horizontal stabilizer with bottom of flag centered horizontally on vertical stabilizer.

ANG, TAIL MARKING: 12 inches (flat black).Both sides of vertical stabilizer, top of letters located 10 inches below and centered under flag.

VERTICAL STAB TIP STRIPE: Top 30 inches of vertical stabilizer to run horizontally not to exceed 15inches. Solid color with no other marking allowed. **Optional.**

TAIL BAND STRIPES: (flat black) 2-inch upper strip located 10 inches below bottom of ANG; 2 inches lower stripe located 12 inches below bottom of upper stripe. Top horizontal stripe will wrap around leading edge and run to the trailing edge of rudder, not to extend onto the rudder trim tabs; bottom stripe will wrap around the leading edge and run to the trailing edge of the rudder. (See Attachment 7).

RADIO CALL NUMBERS: 12 inches (flat black). Both sides of vertical stabilizer, top of numbers located 10 inches below bottom of lower tail band stripe, centered under flag. (See Attachment 7).

NOSE CALL NUMBERS: 4 digit, 6 inches (flat black) **Optional.** Location starting at FS 139 (measurement is for H model aircraft, and may vary on older aircraft) and runs aft. The bottom of numbers is horizontal with the bottom of the lower pilot window WL 200.00 to 198.00.

UNIT CALL NUMBERS/LETTERS: 6 inches (flat black) **Optional**. Top of number/letter is located 6 inches from the bottom of the nose call number, starting at FS 139.

AIR FORCE OUTSTANDING AWARD: 3 inches by 12 inches (flat decal, contrasting grays or flat black), centered 3 inches above crew entry door. **Optional**.

PILOT/CREW CHIEF/ASSISTANT NAMES: (flat black) **Optional**. Names can be located on either side of the fuselage. Size and location determined by the unit.

COMMAND MINUTEMAN INSIGNIA: 30 inches (flat black or gray decal) **Optional**. Both side of vertical stabilizer centered with the flag. The top of the emblem is 10 inches from the bottom of the call number.

STATE NAME: 10 inch (flat black), centered on FS 551.00 and 10 inches from main landing gear door hinge point. (Attachment 7).

BLACK EXHAUST TRACKS: **Optional**. C-130 engineering has approved, at field level, the widening of exhaust tracks from 60 inches to 96 inches, on the bottom of the wing and flap area. Application is also extended to the top of the flaps, if desired. SPD approval is on file at ANG/LGMM.

**A6.16. F-15**

Hawaii aircraft are authorized to use the PACAF Tail Marking configuration, in flat black on their aircraft.

COMMAND MINUTEMAN INSIGNIA: 18 inches (flat black) **Optional**. Location TBD by Wing Commander (tails or fuselage).

ORGANIZATIONAL INSIGNIA: 18 inches (flat decal or flat colors) **Optional**. Vertical: Bottom of insignia on WL 100.0. Horizontal: Forward edge of insignia on FS 458.0.

UNIT DESIGNATOR: 24 inches (flat black) **Optional**. Vertical: Top of letters even with top of rudder. Horizontal: Leading edge of first letter on FS 760.0.

PILOT and CREW CHIEFS NAMES: Size TBD by unit **Optional**. Pilot name centered below left windscreen frame and crew chief and assistant crew chief names centered below right wind screen frame.

AIR FORCE OUTSTANDING AWARD: 3 inches by 12 inches (flat decal, contrasting grays or flat black), centered 3 inches above crew entry door. **Optional**.

NOSE NUMBER: 4 inches (flat black) **Optional.** Last three or four digits of tail number vertically on left and right side of nose gear door.

RADIO CALL NUMBER: 15 inches (flat black), location IAW 1F-15A-23, Fig 10-l.

### A6.17. F-16

COMMAND MINUTEMAN INSIGNIA: 18 inches (flat black) **Optional,** location TBD by Wing Commander, (tail or fuselage).

ORGANIZATIONAL INSIGNIA: 10 inches (subdued decal or flat colors) **Optional**. Vertical: Top of insignia 11 inches below fuselage/intake splitter vane. Horizontal: Leading edge 52 inches aft of intake duct lip.

UNIT DESIGNATOR: 18 inches (flat black) **Optional.** Vertical: Bottom of numbers at WL 158.0. Horizontal: Leading edge of first letter on FS 482.07.

AIR FORCE OUTSTANDING AWARD: 3 inches by 12 inches (flat decal, contrasting grays or flat black), centered 3 inches above crew entry door. **Optional**.

PILOT and CREW CHIEFS NAMES: Size TBD by unit. **Optional**. Pilot name on left canopy rail and crew chief and assistant crew chief names on right canopy rail.

NOSE NUMBER: 4 inches (flat black); last three or four digits of tail number on both sides of nose gear door.

RADIO CALL NUMBER: 12 inches (contrasting gray) ***NOTE:*** Field units may change call numbers to flat black at home station. Aircraft returning form depot will be painted in contrasting gray IAW 1F-16C-2-00GV-00-1.

### A6.18. HH-60

COMMAND MINUTEMAN INSIGNIA: 10 inches (flat black) **Optional; l**ocation TBD by Wing Commander.

ORGANIZATIONAL INSIGNIA: 10 inches (subdued decal or flat colors) **Optional**. Wing: on right cargo door 8 inches below forward window, centered. Squadron: on left cargo door, 8 inches below forward window, centered.

UNIT DESIGNATOR: 9 inches (flat black) **Optional**. Left side: Position 21.5 inches below WL 319.633, centered. Right side: Positioned 19 inches below WL 319.633, centered.

PILOT/AIRCREW/CREW CHIEF NAMES: 3 inches maximum (flat black) **Optional.** Pilot: Right door, 2.5 inches below window, centered. Copilot: Left door, 2.5 inches below window, centered. Crew chief/assistant: Crew chief, right cargo door, 3.1 inches below and centered on forward window. Assistant: Left cargo door, 3.1 inches below and centered on forward window.

AIR FORCE OUTSTANDING AWARD: 3 inches by 12 inches (flat decal, contrasting gray or flat black), centered 3 inches above crew entry door. **Optional**.

**A6.19. C-5**

UNITED STATES FLAG: 24 inches by 48 inches (Matte). Both sides vertical stabilizer, bottom of flag on WL 626, Top of flag, horizontally centered between the 10 percent chord front beam and the 64 percent rear chord beam.

ANG, TAIL MARKING: 18 inches (flat black). Both sides of vertical stabilizer, top of letters located 12 inches below bottom of flag. Top letters will be horizontally centered between 10 percent chord front beam and the 64 percent rear chord beam.

TAIL BAND STRIPES: (flat black) 2 inch upper strip located 12 inches below bottom of "ANG"; 2 inches lower stripe located 12 inches below bottom of upper stripe. Top horizontal stripe located 18 inches down from bottom of upper stripe. Stripe will run horizontally from aft edge of the leading edge seam, back to trailing edge of the rudder.

RADIO CALL NUMBERS: 18 inches (flat black). Both sides of vertical stabilizer, top of numbers located 12 inches below bottom of lower stripe. Top of numbers will be horizontally centered between the 10 percent chord front beam and the 64 percent rear chord beam.

LOCAL STATION NUMBERS: 12 inches (flat black) **Optional**. Last 4 digits of aircraft serial number, located on both sides of fuselage, top of numbers on stringer 12 on the left side and stringer 11 on the right of fuselage, forward edge of number 9 inches aft of nose seam.

UNIT IDENTIFIER: 10 inches (flat black) **Optional**. Both sides of fuselage, centered under station number.

AIR FORCE OUTSTANDING AWARD: 3 inches by 12 inches (flat decal, contrasting grays or flat black), centered 3 inches above crew entry door. **Optional.**

PILOT/CREW CHIEF/ASSISTANT NAMES: (flat black) **Optional**. Names can be located on either side of the fuselage. Size and location determined by the unit.

COMMAND MINUTEMAN INSIGNIA: 34 inches (flat black or gray decal) **Optional**. Location: Both side of fuselage, top of emblem placed 2 inches below clear view window, aft most portion placed 2 inches forward of window centerline.

STATE NAME: 21inch (flat black), location: Centered on both sides of each main landing gear door.

NATIONAL STAR INSIGNIA OUTLINE: 36 inches (flat black). Both sides of fuselage, centered 59 inches aft of FS 1964 on WL 258.

AIR NATIONAL GUARD: 12 inches (flat black), location: centered on underside of fwd nose cargo door.

**A6.20. C-141**

UNITED STATES FLAG: 24 inches by 48 inches (Matte). Both sides vertical stabilizer, bottom of flag on WL 426 (47 inches below VOR antenna), top horizontally centered between the leading edge aft seam and rudder hinge access panel leading edge.

ANG, TAIL MARKING: 12 inches (flat black). Both sides of vertical stabilizer, top of letters located 12 inches below bottom of flag with top horizontally centered between stabilizer leading edge and trailing edge.

TAIL BAND STRIPES: (flat black) 2 inch upper strip located 12 inches below bottom of ANG; 2 inches lower stripe located 12 inches below bottom of upper stripe. Stripe will run horizontally from aft edge of the leading edge seam, back to trailing edge of the rudder.

RADIO CALL NUMBERS: 12 inches (flat black). Both sides of vertical stabilizer, top of numbers located 12 inches below lower edge of bottom tail stripe. Top of numbers will be horizontally centered between leading edge aft seam and rudder hinge access panel leading edge.

LOCAL STATION NUMBERS: 6 inches (flat black) **Optional**; last 4 digits of aircraft serial number, located on both sides of fuselage, centered on WL 191, 48 inches aft of FS 275 to center of marking.

UNIT IDENTIFIER: 6 inches (flat black) **Optional.** Both sides of fuselage, parallel to aircraft waterline, centered 4 inches under station number.

AIR FORCE OUTSTANDING AWARD: 3 inches by 12 inches (flat decal, contrasting grays or flat black) centered, 3 inches above crew entry door. **Optional**.

PILOT/CREW CHIEF/ASSISTANT NAMES: (flat black) **Optional**. Names can be located on either side of the fuselage. Size and location determined by the unit.

COMMAND MINUTEMAN INSIGNIA: 34 inches (flat black or gray decal) **Optional**. Both sides of fuselage, top forward corner of emblem placed 12 inches aft and even with top of crew entry door.

STATE NAME: 10 inch (flat black), centered on both sides of main landing gear wheel well assembly.

NATIONAL STAR INSIGNIA OUTLINE: 15 inches (flat black); both sides of fuselage, centered on FS 1382 on WL 218.

**A6.21. C-17**

UNITED STATES FLAG: 24 inches by 48 inches (Matte). Both sides vertical stabilize. Bottom of flag located 42 inches above top edge of the of the upper tail band stripe, with the top forward corner of the flag located 1 inch from the VOR/LOC-2 antenna.

ANG, TAIL MARKING: 18 inches (flat black). Both sides of vertical stabilizer, bottom of letters located 12 inches above top edge of the top tail band stripe and centered on an (invisible) vertical line drawn parallel with vertical stabilizer trailing edge that intersects the center of the flag.

TAIL BAND STRIPES: (flat black) 2inch stripes, top of upper stripe located at vertical stabilizer coordinated ZV 134. Top of lower stripe is located 18 inches below bottom of upper stripe. Stripes run horizontally from aft edge of leading edge seam to trailing edge of rudder.

RADIO CALL NUMBERS: 12 inches (flat black). Both sides of vertical stabilizer, top of numbers located 12 inches below bottom of lower tail band stripe, centered on an invisible vertical line drawn parallel with the vertical stabilizer trailing edge, intersecting center of the flag.

LOCAL STATION NUMBERS: 18 inches (flat black) **Optional**. Last 4 digits of aircraft serial number, located on both sides of the fuselage, centered below the lower aft corner of the down view window, with the top of the numbers on fuselage coordinate Z-192.

UNIT IDENTIFIER: 10 inches (flat black) **Optional**. Both sides of fuselage, centered on the station number, top of numbers 6 inches below the bottom of the station number.

AIR FORCE OUTSTANDING AWARD: 3 inches by 12 inches (flat decal, contrasting grays or flat black), centered 3 inches above crew entry door. **Optional**.

PILOT/CREW CHIEF/ASSISTANT NAMES: (flat black) **Optional**. Names can be located on either side of the fuselage. Size and location determined by the unit.

COMMAND MINUTEMAN INSIGNIA: 34 inches (flat black or gray decal) **Optional**. Both sides of fuselage, most forward edge of emblem located 3 inches aft of fuselage light ring, bottom tip of emblem almost touching longeron L-32.and even with top of crew entry door.

STATE NAME: Size TBD by unit (flat black), centered on both sides of main landing gear wheel well assembly.

NATIONAL STAR INSIGNIA OUTLINE: 30 inches (flat black); both sides of fuselage, centered on centerline of the aft fuselage formation light, with the insignia leading edge located 6 inches aft of the light.

U.S. AIR FORCE MARKING: 24 inches (flat black); both sides of fuselage, located 12 inches aft of fuselage station 27.200 and 35.38 inches above longeron 1-25.

**A6.22. KC-135**

Aircraft assigned to Hawaii and Alaska aircraft are authorized to use the PACAF tail marking configuration (HH or AK), in flat black, # 37038 on aircraft that painted Equipment Excellence Flat gray, color # 36173.

UNITED STATES FLAG: 21 inches by 40 inches (Matte); both sides vertical stabilizer, bottom of flag on WL 447, centered between stabilizer leading and trailing edges, not to include rudder.

ANG TAIL MARKING: 12 inches (flat black); both sides of vertical stabilizer, centered between stabilizer leading and trailing edges, not including rudder.

TAIL BAND STRIPES: (flat black). Two inch upper strip grounded at WL 568.90, top of the lower 2-inch stripe located 12 inches below the bottom of the upper stripe.

RADIO CALL NUMBERS: 12 inches (flat black); both sides of vertical stabilizer, top of numbers located 12 inches below ANG tail marking, centered between stabilizer leading and trailing edges, not including rudder.

LOCAL STATION NUMBERS: 6 inches (flat black) **Optional.** Last 4 digits of aircraft serial number, both sides of fuselage. Locate according to T.O. 1C-135-8.

UNIT IDENTIFIER: 6 inches (flat black) **Optional**; both sides of fuselage centered 6 inches under station number.

AIR FORCE OUTSTANDING AWARD: 3 inches by 12 inches (flat decal, contrasting grays or flat black) centered 3 inches above crew entry door. **Optional**.

PILOT/CREW CHIEF/ASSISTANT NAMES: (flat black) **Optional**. Names can be located on either side of the fuselage. Size and location determined by the unit.

COMMAND MINUTEMAN INSIGNIA: 34 inches (flat black or gray decal) **Optional**; both sides of fuselage, 16 inches aft of crew entry door, 6 inches below USAF markings.

BOOM ELEVATORS: 10 inches (Color # 36622). Highest numeric designator of station assigned centered on the underside of the left ruddevator and alpha designator (ANG) centered on underside of the right ruddevator.

## Attachment 7

## Typical ANG Tail Marking Configurations

The following illustrations are provided for units that operate C-130, KC-135, C-5, C-141, or C-17 aircraft, which better define standard marking authorized for ANG airlift aircraft that belong to different gaining commands. Special Mission aircraft are exempt from these requirements, and must be marked IAW AF Drawings for their mission. (Arctic, AFSOC, Rescue) Wing Commander options are authorized per Attachment 6.

**Figure A7. Typical ANG Tail Marking Configurations.**

**AMC/AETC Gained**


C-130

Equipment Excellence Gray Tail


KC-135

Equipment Excellence Gray Tail Scheme and Standard Markings


State Name Marking Sample

This marking is authorized on all C-130, C-141, C-5 and C-17 aircraft. Length, width and height will very with each aircraft. TBD By Unit


C-5,C-141, C-17

Equipment Excellence Tail Scheme & Markings

**PACAF gained (Hawaii or Alaska) Optional tail markings**


C-130

Equipment Excellence Tail Scheme


KC-135

Equipment Excellence Tail Scheme